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ABSTRACT

The third in a series of six guidebooks on minimum course content for second-year algebra, this booklet covers relations, functions, and solving and graphing linear equations, linear inequalities, systems of equations, and systems of inequalities. Overall course goals are specified, a course outline is provided, performance objectives are listed, and text references keyed to the performance objectives are given. A sample posttest is included along with a 13-item bibliography. For other booklets in this series, see SE 017 026. (DT)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

ALGEBRA 2r

5216.23

MATHEMATICS

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1971

SE 017 047

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QUINMESTER MATHEMATICS

COURSE OF STUDY

FOR

ALGEBRA 2r

5216.23

(EXPERIMENTAL)

Written by

June Ellis

for the

DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida 33132
1971-72

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PREFACE

The following course of study has been designed to set a minimum standard for student performance after exposure to the material described and to specify sources which can be the basis for the planning of daily activities by the teacher. There has been no attempt to prescribe teaching strategies; those strategies listed are merely suggestions which have proved successful at some time for some class.

The course sequence is suggested as a guide; an individual teacher should feel free to rearrange the sequence whenever other alternatives seem more desirable. Since the course content represents a minimum, a teacher should feel free to add to the content specified.

Any comments and/or suggestions which will help to improve the existing curriculum will be appreciated. Please direct your remarks to the Consultant for Mathematics.

All courses of study have been edited by a subcommittee of the Mathematics Advisory Committee.

CATALOGUE DESCRIPTION

The third of 6 quins which together contain all of the concepts and skills usually found in second-year algebra. A further development of the concepts, notation and graphing of functions and relations. Includes the solving and graphing of linear equations and inequalities and of systems of linear equations and inequalities.

Designed for the student who has mastered the skills and concepts of Algebra 2p and 2q.

TABLE OF CONTENTS

	Page
Goals	3
Text Bibliography	3
Course Outline	4
Objectives, Strategies, and References	5
Sample Posttest Items	8
Key to Posttest Items	10
Bibliography	12

OVERALL GOALS

The student will:

1. Develop his understanding of relations and functions.
2. Develop his skill in graphing linear relations.
3. Begin his study of inverse functions.

TEXT BIBLIOGRAPHY

(*State Adopted)

*D_3 - Dolciani, Mary; Berman, Simon; and Wooton, William. Modern Algebra and Trigonometry, Book 2. Boston: Houghton Mifflin Company, 1963

*D_8 - Dolciani, Mary; Wooten, William; Beckenbach, Edwin; Sharron, Sidney. Modern School Mathematics, Algebra II and Trigonometry. Boston: Houghton Mifflin Company, 1968.

N - Nichols, Eugene D.; Heimer, Ralph T.; Garland, Henry C. Modern Intermediate Algebra. New York: Holt, Rinehart and Winston, Inc., 1965.

*PL - Payne, Joseph N.; Zamboni, Floyd F.; and Lankford, Francis G.,Jr. Algebra Two with Trigonometry. New York: Harcourt, Brace and World, Inc., 1969.

*PA - Pearson, Helen R. and Allen, Frank B., Modern Algebra, A Logical Approach, Book Two. Boston: Ginn and Company, 1966.

COURSE OUTLINE

Related Objectives	
	I. Relations and Functions
1	A. Definitions of relations 1. Ordered pairs 2. Mappings
	B. Definitions of functions 1. Ordered pairs 2 Mappings
2	C. Domain and range
3	D. Composition functions f(g(x))
	II. Linear Equations and Inequalities
	A. Graphing
4	1. Linear equations a. Given the equation b. Given its slope and the coordinates of a point on the line
6	2. Inverse of a linear function
7	3. Linear inequalities
5	B. Writing a linear equation 1. Given the graph 2. Given two points 3 Given a point and the slope
	III. Systems of Equations and Inequalities
	A. Graphing
8	1. Systems of equations a. Identify the solution set b. Classify as consistent, inconsistent, dependent, independent.
9	2. Systems of inequalities a. Identify the solution set
10	**IV. Problem Solving Using Graphing Techniques**

PERFORMANCE OBJECTIVES AND STRATEGIES	TEXT REFERENCES				
The student will:	D_3	D_8	N	PA	PL
1. Define describe or recognize a relation and a function.	203-206	151-159	158-173	31 269 270 288-290	194-220
Helpful for students to recall that a function is a relation in which different ordered pairs have different first coordinates.					
Differentiating between "into" and "onto" mappings is not relevant to this course.					
Refer to Payne et al for various mapping illustrations					
Intuitive definition of mapping suggested by pairing of each geographical point of a locale with a particular point on the map of that locale. (see Dolciani et al page 154)					
2. Determine the domain and range of given relations and functions.					
Students often remember that the first coordinate of an ordered pair is a member of the domain and the second an element of the range by recalling the alphabetical order "d" before "r" and relating this to the first or x-coordinate and the second or y-coordinate.					

3. Find f(g(x))given f(x) and g(x).

If Nichols or Dolciani text is used, see Pearson/Allen and Payne for mappings which illustrate finding the range of f to include the domain of g first, then finding the range of g.

TEXT REFERENCES

D_3	D_8	N	PA	PL
81-95	160-161	132-135	132-135	219-236
211-212	168-177	140-142	140-145	
298-300	180-182	177-178	177-178	
			314-316	

4. Graph a linear equation in two variables.

Graph $ax + by = c$ by rewriting as $y = \frac{-ax}{b} + \frac{c}{b}$

Assign values to 'x', solve for y, and plot the resulting ordered pairs.

x	$\frac{-ax}{b}$	$+\frac{c}{b}$	y
-3			
1			
0			
1			
3			

Rewriting $ax + by = c$ as $y = \frac{-ax}{b} + \frac{c}{b}$ should lead the student to the conclusion that $\frac{-a}{b}$ is the slope of the equation and $\frac{c}{b}$ is the 'y' intercept.

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-a}{b}$$

5. Determine the equation of a line from a graph, given 2 points, or given 1 point and the slope.

6. Define, recognize, and graph the inverse of a linear function.

   This is the student's introduction to inverse functions and is a basis for his work in later quins, so try to build a strong foundation.

7. Graph 'linear' inequalities.

   An understanding of boundary and half-plane is important here.

8. Graph a system of linear equations and identify its solution set.

9. Graph a system of linear inequalities and identify its solution set.

TEXT REFERENCES

D_3	D_8	N	PA	PL
	197-203 216-221	177 178 186-189 290-294 324-327	648-651	291-293 303-306 311-314

10. Write and solve mathematical models for word problems.

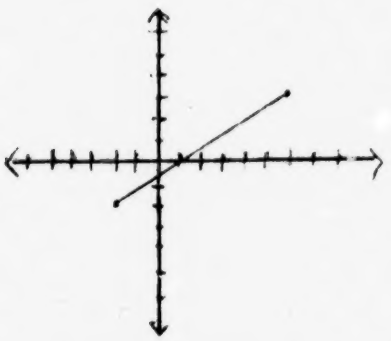
TEXT REFERENCES

D_3	D_8	N	PA	PL
212-217	180-185	179-181	307-310	207

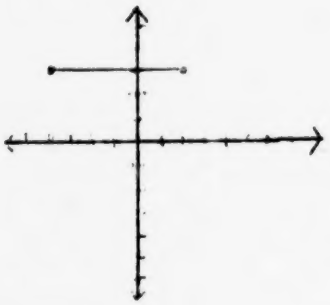
SAMPLE POSTTEST ITEMS

Related Objective	
1	1. Define a relation.
2	2. Determine the range and the domain of each of the following relations.

a)



b)



1	3. Draw a figure of each relation to represent it as a mapping.

a) $\{(3, 1), (2, 1), (4, 4), (5, 3)\}$

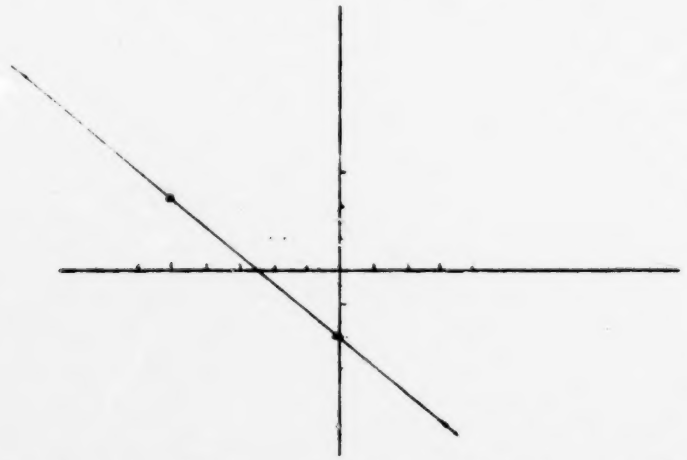
b) $\{(1, 1), (1,-1), (2, 2), (2,-2)\}$

c) $\{(x, y) \mid y = 2, \quad 0 < x < 5, \quad x \in I\}$

1	4. Identify which of the relations above are functions.
3	5. Find $g(f(2))$ when $f(x) = 2x + 3$ and $g(x) = x + 2$.
4	6. Graph on the coordinate plane. $3x - 4y = 12$
7	7. Graph on the coordinate plane. $4x + y < 3$
7	8. Graph on the coordinate plane. $x - 2y > 0$
6	9. Draw the graph of $f^{-1}(x)$ if $f(x) = 3x + 2$.

Related
Objective

5 10. Determine the equation of the line graphed below.



5 11 Determine the equation of the line whose slope is $\frac{-5}{4}$ that passes through (2, -3).

5 12. Determine the equation of the line through (0, -1) and (-5, 7).

8 13. Graph on the coordinate plane.

a) $\begin{cases} x - y = 8 \\ 5x - 5y = 25 \end{cases}$ c) $\begin{cases} 4x + 4y = 16 \\ x + y = 4 \end{cases}$

b) $\begin{cases} x = 4y \\ \frac{x}{4} + y = 10 \end{cases}$

8 14. Classify each of the systems above as:

i) consistent

ii) inconsistent

iii) dependent or independent.

9 15. Solve graphically

$$\begin{cases} x - y > 0 \\ 2x + y < 6 \end{cases}$$

10 16. Suitable word problems can be found in the references listed in this quin.

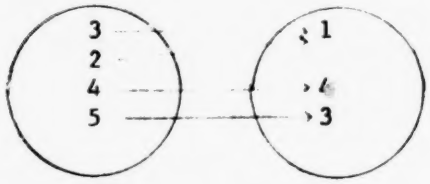
Answer Key to POSTTEST ITEMS

1. Teacher Evaluation

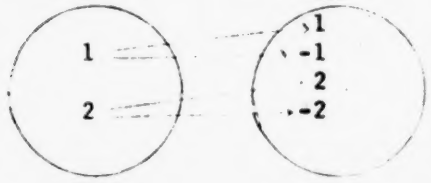
2. a. $\{x \mid -2 < x < 6\} \wedge \{y \mid -2 < y < 3\}$

   b. $\{x \mid -3 \leq x \leq 2\} \wedge \{y \mid y = 3\}$

3. a.



   b.



   c.

4. a and c

5. 9

6. Teacher Evaluation

7. Teacher Evaluation

8. Teacher Evaluation

9. Teacher Evaluation

10. $y = -\frac{4}{5}x - 2$ OR $4x + 5y + 10 = 0$

11. $y = -\frac{5}{4}x - \frac{1}{2}$

12. $y = -\frac{8}{5}x - 1$

13. Teacher evaluation

14. a) Inconsistent

    b) Consistent, independent

    c) Consistent, dependent

15. Teacher evaluation

16. Teacher evaluation

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